Asset Management Pilot Project in Waterbury, VT

Green Mountain Water Environment Association

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Agenda

- What is Asset Management (AM)?
- Benefits of Asset Management
- The AM Process
- Our pilot project in Waterbury
- Lessons Learned
- Outcomes

What is Asset Management (AM)?

- Decision making methodology of how to best spend your money
  - Seeks to *minimize total costs* of ownership of assets…
  - Assists decision making with *limited resources…*
  - While continuously delivering *the service levels* customers desire and regulators require…
  - At an acceptable level of *risk* to the organization

AM Increasingly Important

- Changing technical, managerial and financial conditions
  - Increasing or decreasing populations
  - Diminishing environmental resources/ restrictions on discharges
  - Aging infrastructure
  - Loss of institutional knowledge e.g. retirements
  - Public resistance to rate increases

Growing need to make every dollar work!

http://trenchlessinternational.com/news/epa_invests_to_renew_or_retire_aging_water_infrastructure/012143/#

A Paradigm Shift…

- Many systems will wait for an asset to fail before replacing it
- Move from *reactive* to *proactive* work environment
- Transition from short-term budgeting to long-term *management of assets by focusing on:*
  - Extending asset life
  - Optimizing maintenance and renewal
  - Developing accurate long-term funding strategies

A Paradigm Shift…

- Bottom-line maintenance 'KPIs' from an AM perspective

Metric	Definition	Target
Availability	The portion of time that a plant or major system is available for producing output of the required quality and quantity	99%
% Failure analysis	The portion of equipment downtime events that undergo a thorough analysis of failure modes, effects, and root causes	85 – 100%
% Planned work	The portion of corrective maintenance work hours that are planned and scheduled in advance (not unplanned breakdowns)	85 – 95%
% Overtime	The portion of maintenance work hours that are performed at an overtime rate	5 – 8%
Relative maintenance cost	**Annual maintenance spending as a percentage of asset replacement value of the plant being maintained**	**1.5 – 2.5%**
Technician productivity	The percent of work hours spent on productive activities versus nonproductive (rework, waiting for parts, etc.)	70 – 85%
% Rework	The portion of maintenance work that has to be redone due to poor installation, shoddy workmanship or incorrect diagnosis	2 - 5%

Table courtesy of EPA Fundamentals of Asset Management training

Benefits of AM

- Increased confidence in decision-making throughout the life of the asset
  - When to repair vs. replace
  - Best time for capital improvement projects
- More efficient operation
  - Financial planning
  - Planned maintenance
  - A reduced life-cycle costs of assets
- Justification for the need for investment to governing body and public
  - Based on a long-term plan with concrete numbers
- Better customer service
  - Improved emergency response

The right work,
the right investment,
at the right time,
for the right reasons

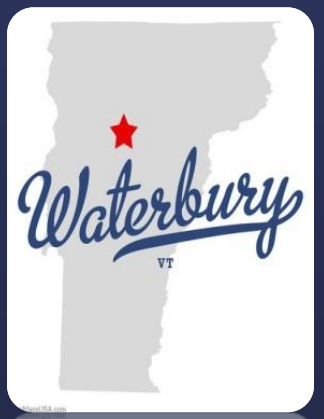
Realistic Expectations for AM

- Takes several years of detailed, *nitty-gritty work* to fully deploy
- Requires eventual commitment of the whole organization
- Needs *upfront* investment to get started

Sets a system up for significant long term savings!

Waterbury Pilot Project

- Why the pilot?
  - Attended a workshop
  - Recognized need for AM in VT
- Chose Waterbury because :
  - Medium size
  - Relatively good records
  - Variety of water sources
  - Willingness to participate



Waterbury Pilot Project

- What did they want?
  - GIS map of the entire system
  - Documentation of institutional knowledge
  - Changing dynamics
- What did we want?
  - Determine the best way to help VT water systems
  - Whole picture
  - Attempt to link GIS and CUPSS
- Chose to use CUPSS (Check-Up Program for Small Systems)
  - Free, User-friendly AM tool developed by EPA
  - Designed for small –medium water and wastewater systems

Project Steps

Memorandum of Understanding with Village

- Form AM Team
- Determine Level of Service goals

Data acquisition and entry phase

- Use GIS to log assets from records
- Treatment plant assets
- Assess condition and value

Upload assets to CUPSS

- Transfer from GIS
- Format in Excel
- Financial information

Transfer all information to Village

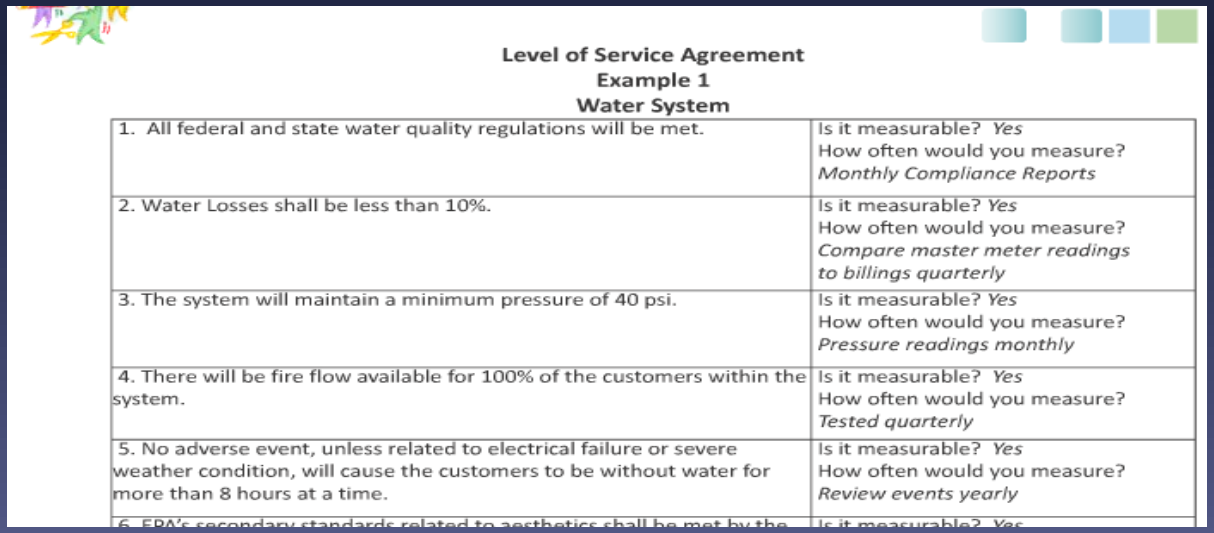
- Begin integration of CUPSS into Daily O&M

Project Steps- Highlights

- Discuss MOU
- Are they “on board”?
- Assemble TeAM to make decisions for the pilot and into future
  - Operator
  - Public Works Director
  - Town Manager
  - Financial representative
  - Town Planner
  - Water Commissioner
  - Others

Project Steps- Level of Service

- Establish Level of Service (LOS) agreement
- Benefits of a LOS
  - Helps assess overall utility performance
  - Helps identify critical assets
  - Provides a direct link between costs and service
  - Serves as an internal guide for utility
  - Communicates energy efficiency and water conservation goals



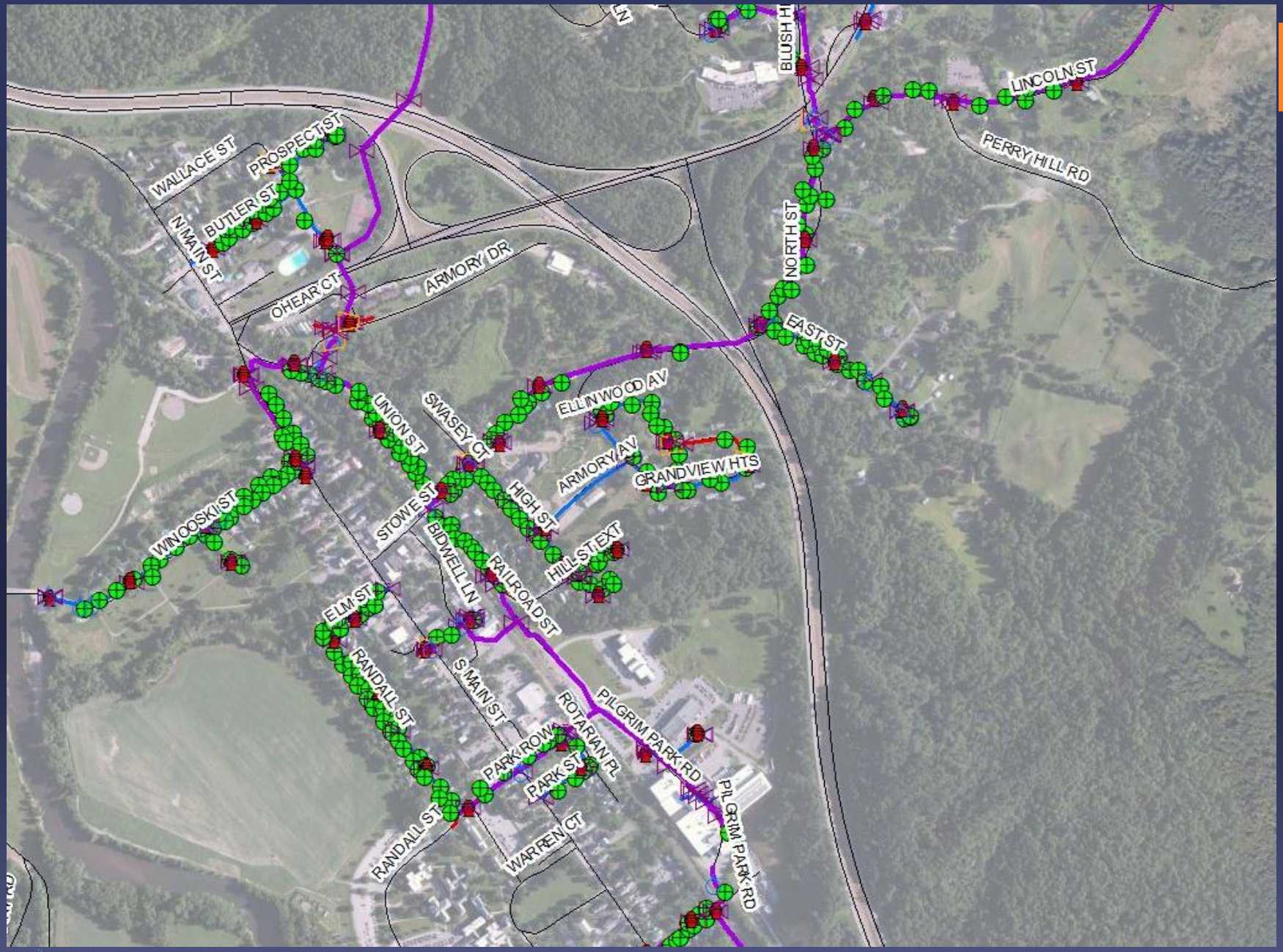
Level of Service Agreement
Example 1
Water System

1. All federal and state water quality regulations will be met.	Is it measurable? *Yes* How often would you measure? *Monthly Compliance Reports*
2. Water Losses shall be less than 10%.	Is it measurable? *Yes* How often would you measure? *Compare master meter readings to billings quarterly*
3. The system will maintain a minimum pressure of 40 psi.	Is it measurable? *Yes* How often would you measure? *Pressure readings monthly*
4. There will be fire flow available for 100% of the customers within the system.	Is it measurable? *Yes* How often would you measure? *Tested quarterly*
5. No adverse event, unless related to electrical failure or severe weather condition, will cause the customers to be without water for more than 8 hours at a time.	Is it measurable? *Yes* How often would you measure? *Review events yearly*
6. EPA's secondary standards related to aesthetics shall be met by the	Is it measurable? *Yes*

VERMONT

Project Steps- Data Collection and Entry

- Most time consuming phase
- Used GIS to input all available records
  - Scanned 180+ record drawings
  - Overlay drawing to satellite photos
  - Draw points and lines
  - Fill-in asset information
- GPS verification of digitized assets
- Manual collection of treatment plant assets
- Assessment of each asset's value and condition


WALLACE ST
PROSPECT ST
BUTLER ST
N MAIN ST
OHEAR CT
ARMORY DR
UNION ST
SWASEY CT
ELLINWOOD AV
ARMORY AV
GRANDVIEW HTS
HIGH ST
STOWE ST
BIDWELL LN
RAILROAD ST
HILL ST EXT
WINOOSKI ST
ELM ST
RANDALL ST
S MAIN ST
PARK ROW
PARK ST
ROTARIAN PL
PILGRIM PARK RD
WARREN CT
NORTH ST
EAST ST
LINCOLN ST
PERRY HILL RD
BLUSH HI

Project Steps- Risk Ratings

- Asked Waterbury which assets they thought were the 5 highest risk assets
- This was their ‘aha’ moment

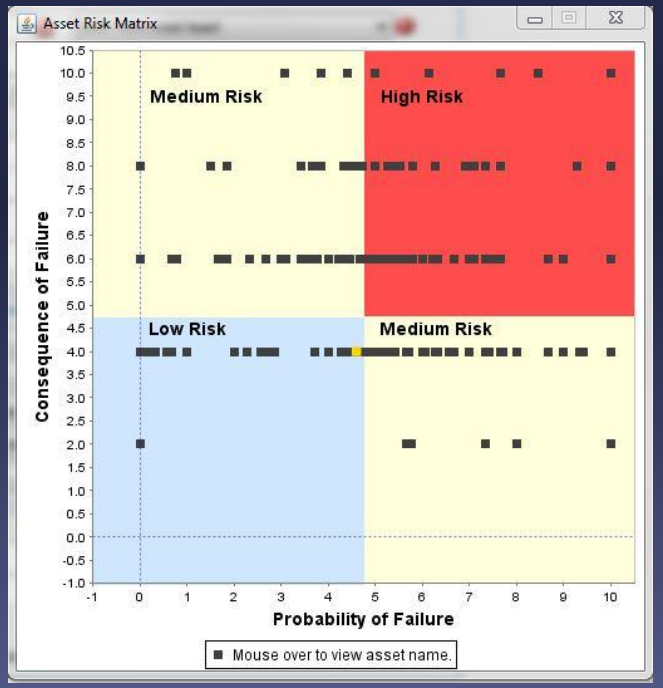
Waterbury Village Water Inventory

The following is a list of assets currently in your inventory. To sort the table click on the column headings. To edit the information, right click on the selected record and click "edit row".

Priority	Asset	Category	AssetType	Condition	CoF	Redundancy	Replacement Date
1	Filter Storage Tank 1	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2013-02-01
2	Filter Storage Tank 2	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2013-02-01
3	Water tank displacement ...	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2013-02-01
4	Water tank displacement ...	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2013-02-01
5	Surface Wash rotating arm 1	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2013-02-01
6	Surface Wash rotating arm 2	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2013-02-01
7	Hypochlorite injector tube 1	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2013-02-01
8	Hypochlorite injector tube 2	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2013-02-01
9	Pressure transducer 3	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2013-02-01
10	Filter media plastic	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2013-02-01
11	Filter media sand gravel	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2013-02-01
12	Filter media plastic	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2013-02-01
13	Filter media sand gravel	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2013-02-01
14	loop powered Indicator	Treatment	Motor Controls / Drives	Fair (Average)	Catastrophic	0%	2013-02-01
15	Process Control panel	Plant controls	Motor Controls / Drives	Fair (Average)	Catastrophic	0%	2013-02-01
16	Filter control panel	Treatment	Treatment Equipment	Fair (Average)	Catastrophic	0%	2015-02-01
17	WM_MainSt	Distribution	Distribution / Collection Ma...	Very Poor	Major	0%	2013-02-01
18	Computer 2	computer	Computer Equipment / So...	Fair (Average)	Major	0%	2013-02-01
19	Spectrophotomoter DR/3...	Lab Equipment	Lab / Monitoring Equipment	Fair (Average)	Major	0%	2013-02-01
20	Turbidimeter 2100N	Lab Equipment	Lab / Monitoring Equipment	Fair (Average)	Major	0%	2013-02-01

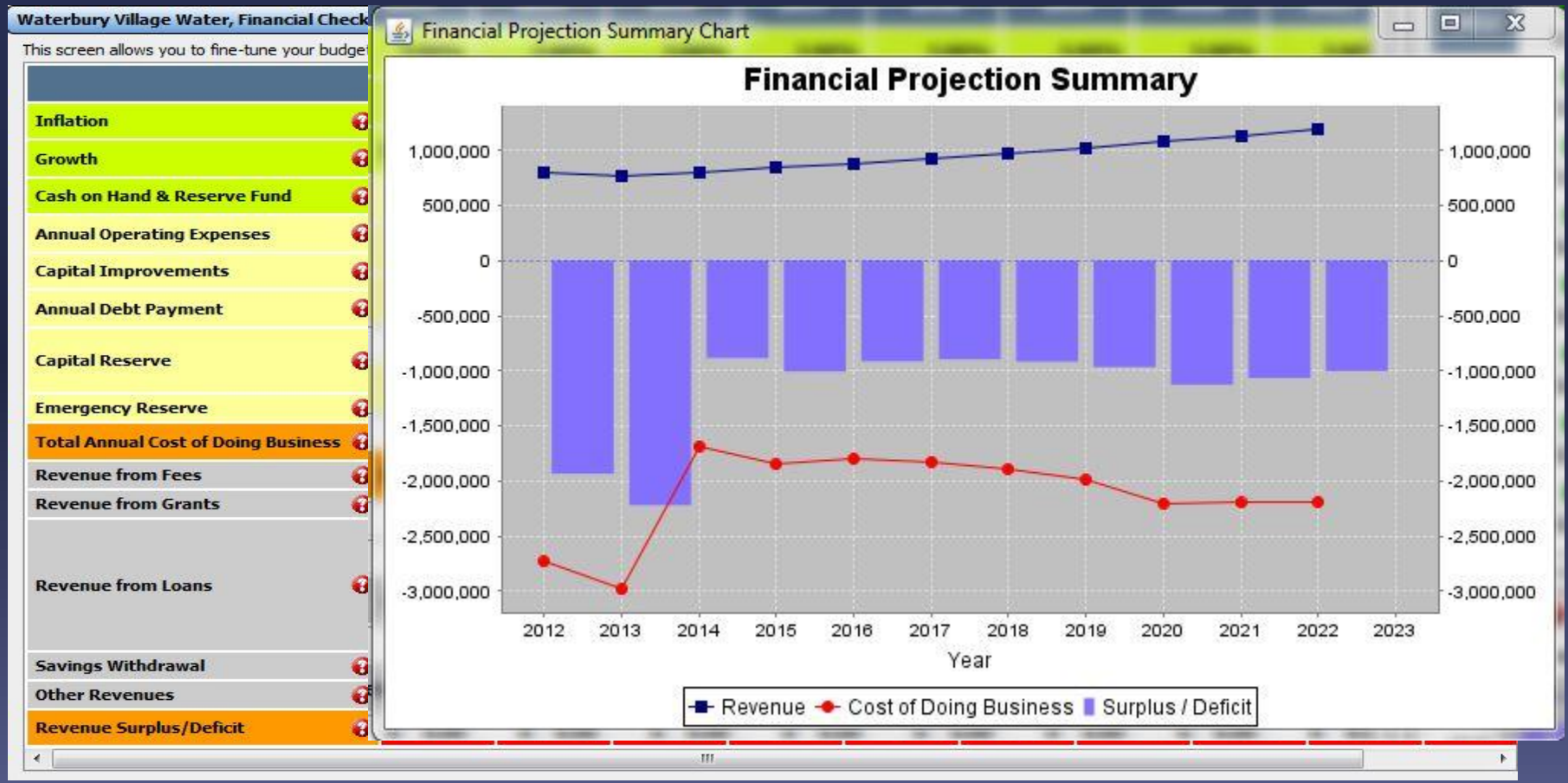
Project Steps- Risk Ratings

- Review Asset Risk ratings
- Risk Factor = PoF x CoF
  - PoF = probability an asset will fail in a given year
    - PoF = $\frac{\text{(Est. Useful life- Remaining Useful life)}}{\text{Est. Useful life}}$ x 1-redundancy x 10
    - Estimated UL = number generated by CUPSS or manually entered
    - Remaining UL = (install year- current year) * Condition
    - Redundancy = manually entered (0%, 50%, 100%, 200%)
  - CoF = consequence of an asset failing
    - Manually entered by CUPSS user



Project Steps- Finances

- Input financial information
- CUPSS will calculate projections based on finances and current cost of assets

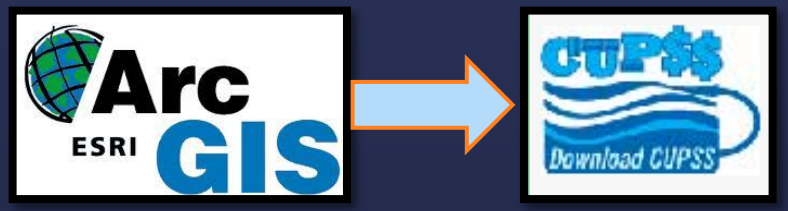


Lessons Learned

- Start small- you can build on it
- Communication
  - Establish LOS goals early
  - How do you intend to use AM?
  - Does the system us GIS?
  - Is the system more comfortable with a spreadsheet?
  - Which assets are most important?
- Decide which assets will be maintained in the inventory
  - Batch manage (ex. all curb stops on a street)
  - The information should be useful, but manageable

Lessons Learned

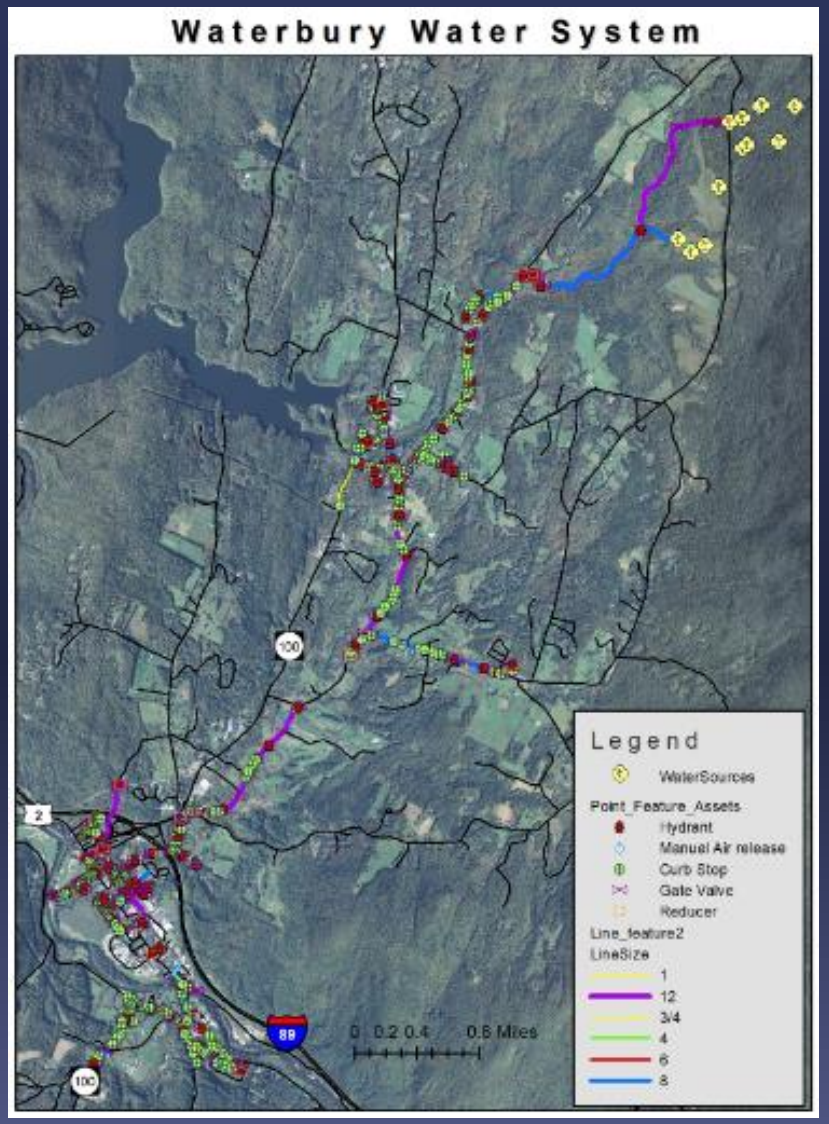
- CUPSS and GIS connection will be difficult for some
  - Not for the 'GIS-lite'
  - Must have good record drawings
  - One way operation
  - GIS is great for data entry



- Realistic Expectations
  - AM will take some initial effort
  - The system must be maintained
  - Must have significant involvement/ buy-in from system
- We came away with a better understanding of how to make this work

Project Steps- Outcomes

- Successful creation of an asset inventory
  - Database of over 2700 drinking water assets
  - Type, condition, age, cost, location, size etc.
- A spatially referenced GIS map of the entire Waterbury water distribution system
- A list of the highest risk assets and recommended replacement dates
- ANR got an understanding of the effort required



"It's very, very difficult to run a first class country or city on second rate infrastructure"